



**US Army Corps
of Engineers®**
Engineer Research and
Development Center

Advanced Tactical POS/NAV Technologies

Technology

This effort will develop a low-cost (affordable), full-time navigation capability for wheeled vehicles. Survivability, lethality, and autonomy, are all linked to the ability to rapidly move about the battlefield. This rapid movement is needed for all involved in the battle, be it a combat infantry or armor unit, an intelligence unit, medical unit, logistics unit, etc. A world-wide navigation capability must provide position and direction information in all types of terrain where natural and man-made features can obstruct the GPS user's view of the sky. The capability to navigate must also be available when GPS signals are jammed. An integrated system of sensors (consisting of: GPS; low-cost dead-reckoning navigation sensors; new, small, and low-cost inertial navigation sensors; and a map display for driver orientation) offers a low-cost solution for this requirement. This integrated system of sensors allows the strengths of one sensor to balance the weaknesses of another. Since the map is a key navigation tool, this effort will also develop new ways to present a digital map on a small screen. The goal is to allow a trained soldier to interpret the terrain during planning and execution of navigation tasks for a mission. The effort will utilize SBIR funding and SBIR contracting. SBIR contractor(s) will develop a concept model of the vehicle navigator for user evaluation. SBIR contractor(s) will develop methods for presenting digital maps on a small screen and will be ready for user evaluation in FY04.

Problem

The vast majority of Army vehicles are wheeled vehicles. When Non-Major Weapon Systems are included the number of vehicles becomes even larger. Most if not all these vehicles lack a full time nav capability. The unit that controls the vehicles has GPS but the only other navigation tools are the compass and map. If GPS signals are lost, navigating with a map and compass results in a significant reduction in navigation capability. A low-cost navigation tool is needed to overcome this deficiency.

The paper map holds a wealth of information. When the viewer moves the map close, a small area of terrain can be seen and the contours are clearly visible and the user can easily interpret the terrain. To view a large area the user just moves the map away. The contour lines are still clear and the characteristics of the terrain can be interpreted. When digital maps are used, the screen size stays the same as the area viewed is enlarged or shrunk. When a large area of terrain is viewed the contour lines will blend on small screens and make terrain interpretation extremely difficult.

Expected Cost To Implement

The target cost of the vehicle navigation capability that will aid GPS is \$2000 per unit.

For the small screen display of digital terrain data the cost has yet to be determined.

Benefits/Savings

The low-cost integrated vehicle navigation capability will provide the Army a full-time navigation capability that can be fielded to the vast majority of the Army's wheeled fleet. When the total Army force has full-time navigation the tempo and execution of the battle can be accelerated.

The small screen display of digital terrain data will allow the soldier to use his paper map reading skills and improve his ability to interpret the terrain.

Status Two contractors under SBIR contracts have completed the development of the prototype vehicle navigation capability. The two contractors were Point Research Corp. 17150 Newhopee Street, Suite 709, Fountain Valley, CA 92708 and Cybernet Systems Corp., 727 Airport Boulevard, Ann Arbor, MI 48108

Cybernet Systems Corp., 727 Airport Boulevard, Ann Arbor, MI 48108, is performing the work on the small screen display of digital terrain data effort. The SBIR contract with Cybernet was award in December 2002. Cybernet is exploring a software approach to viewing the terrain in 3-D. A second SBIR contract will be award to Physical Optics Corp., 20600 Gramercy Place Bldg 100, Torrance, CA 90501. Physical Optics is looking at a hardware/software approach to view 3-D.

ERDC POC U.S. Army Engineer Research and Development Center, Topographic Engineering Center (TEC), ATTN: CEERD-TR-A, 7701 Telegraph Road, Alexandria, VA 22315-3864; e-mail: rd1@tec.army.mil

Distribution Sources Point Research Corp. 17150 Newhope Street, Suite 709, Fountain Valley, CA 92708

POC Robert Levi, 714-557-6180

Cybernet Systems Corp., 727 Airport Boulevard, Ann Arbor, MI 48108

For vehicle navigator POC Nestar Voronka 734-668-2567 ext: 106

For Small Screen Display POC Douglas Haanpaa 734-668-2567

Physical Optics Corp., 20600 Gramercy Place Bldg 100, Torrance, CA 90501.

POC Dr. Andrew Kostrzewski 310-320-3088

Available Documentation Under SBIR guidelines, information is available to Government agencies.

Available Training To Be Determined

Available Support To Be Determined